

Claims

1. A normalisation apparatus arranged to normalise a first signal with respect to a second related signal, the apparatus comprising comparator means arranged to discriminate the first signal, characterised in that the first signal represents a series of events and the normalisation apparatus further comprises means for spreading the first signal over a predetermined energy distribution, and means for automatically adjusting a discrimination level of the comparator means in response to a property of the second signal such that a proportion of the distributed signal is discarded by the comparator means.
2. A normalisation apparatus according to claim 1, wherein the first signal is representative of photons emitted or scattered by a sample in response to an excitation, and the second signal is representative of a property of the excitation.
3. A normalisation apparatus according to claim 2, wherein the predetermined distribution is a function of a detector arranged to detect the emitted or scattered photons.
4. A normalisation apparatus according to claim 3, wherein the detector is a photo-multiplier tube.
5. A normalisation apparatus according to claim 1 or 2, wherein the predetermined distribution is provided by a dedicated electrical circuit.
6. A normalisation apparatus according to any of claims 1 to 5, wherein the first signal is delayed in order that the normalisation may be synchronised with the second signal.
7. A normalisation apparatus according to claim 6, wherein the first signal is representative of photons emitted or scattered by a sample, and the delay occurs prior

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to detection of the emitted or scattered signal, the delay being provided by optical delay of the emitted signal.

8. A normalisation apparatus according to claim 2 or any claim dependent thereon, wherein the discrimination level of the comparator means is a function of the intensity of the excitation.

9. A normalisation apparatus according to claim 8, wherein the discrimination level of the comparator means varies according to the inverse of the intensity of the excitation.

10. A normalisation apparatus according to claim 2 or any claim dependent thereon, wherein the excitation is pulsed, and the discrimination level of the comparator means is determined by a property of a first excitation pulse and then held at that level until a subsequent excitation pulse occurs.

11. A normalisation apparatus according to claim 10, wherein the discrimination level of the comparator means is a function of the energy of the excitation pulse.

12. A normalisation apparatus according to claim 10 or 11, wherein an output from the comparator means is directed to a plurality of counters, each counter being arranged to increment in response to the emitted or scattered signal detected at a predetermined delay following an excitation pulse.

13. A normalisation apparatus according to any preceding claim, wherein the discrimination level of the comparator means is an upper level, such that that proportion of the distributed signal which lies above the discrimination level is discarded by the comparator means.

14. A normalisation apparatus according to any of claims 1 to 12, wherein the discrimination level of the comparator means is a lower level, such that that

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*proportion* of the distributed signal which lies below the value of the discrimination level is discarded.

15. A normalisation apparatus according to claim 14, wherein the discrimination level is prevented from having a value which is less than a predetermined minimum.

*Sub A4* 16. A normalisation apparatus according to any preceding claim, wherein the adjustment of the discrimination level is achieved by adding or subtracting values from the distributed signal such that the predetermined energy distribution is shifted in relation to the discrimination level.

17. A normalisation apparatus according to any preceding claim, wherein a variable delay is introduced into the adjustment of the discrimination level of the comparator means, to provide a phase difference measurement.

18. A normalisation apparatus according to any of claims 1 to 16, wherein the apparatus is provided with a series of comparator means, the comparator means being provided with different delays, thereby providing a phase difference measurement.

19. A normalisation apparatus according to claim 18, wherein at least one of the delays is adjustable.

*Sub A5* 20. A normalisation apparatus according to claim 18 or 19, wherein the time resolution of at least one comparator means is adjustable, thereby providing an adjustable channel width for the phase difference measurement.

21. A normalisation apparatus according to claim 20, wherein the time resolution of each of the comparator means is adjusted by changing the integration time of at least one component which processes the second signal.

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22. A normalisation apparatus according to claim 19, 20 or 21, wherein at least one of the adjustments is automated to locate specific features of the phase difference measurement.

23. A normalisation apparatus according to any of claims 17 to 22, wherein a variable delay is applied to the first signal, thereby providing a further phase difference measurement.

24. A method of normalising a first signal representative of a series of events, with respect to a second related signal, characterised in that the first signal is spread over a predetermined distribution, and a discrimination level of a comparator means is automatically adjusted in response to a property of the second signal such that a proportion of the distributed first signal is discarded by the comparator means.

25. A method of normalising a signal according to claim 24, wherein a series of delays are introduced into the adjustment of the discrimination level of the comparator means, to provide a phase difference measurement.

26. A method of normalising a signal according to claim 25, wherein the delays are adjusted by a user in order to provide phase difference measurements at delays of particular interest.

27. A normalisation apparatus substantially as hereinbefore described with reference to the accompanying figures.

28. A method of normalising substantially as hereinbefore described with reference to the accompanying figures.